MATH 523: FUNCTIONAL ANALYSIS

FALL 2015

Course Information:

- **Instructor**: Dr. Zhenghe Zhang, zzhang@rice.edu
- **Office**: Herman Brown Hall (HBH) 426
- **Class meeting**: 2:00PM–2:50PM, MWF, HBH 453
- **Office hour**: By appointment
- **Texts**: *Real and Complex Analysis* (3rd Edition), Walter Rudin. *Functional Analysis* (2nd Edition), Walter Rudin.
- **Reference**: *Methods of Modern Mathematical Physics I: Functional Analysis*, Barry Simon.
- **Class Website**: Look for **Math 523 001 F15** on Owlspace

Prerequisites: Linear Algebra, Point-set Topology, Some beginning real analysis.

Course Description:

Functional Analysis deals roughly with infinite dimensional *normed* vector spaces (e.g. *Banach space*, *Hilbert space*) and the linear operators acting on them (e.g. *self-adjoint operators, unitary operators*). It has lots of connections with real and complex analysis, differential equations, physics (e.g. quantum theory), and dynamical systems. In this class, I will start with some concrete spaces like L^p spaces on some compact intervals and $\ell^2(\mathbb{Z})$. Then I will move on to the abstract setting and discuss some basic results and techniques in Hilbert and Banach Spaces. Eventually, I hope I will be able to give a detailed treatment of spectral theory of self-adjoint operators.

Exam and Grades:

There is no exam. The grades will be based on a series of homework assignments and attendance.

Homework:

Homework will be assigned on Owlspace and be collected in class every other week (mostly, at the beginning of Monday's class). You are encouraged to work together on homework. You must write and understand your own solution. **No late homework will be accepted once due time is indicated.**

Participation & Attendance:

Attendance will be very important in this class. I expect students to attend every class and arrive on time. Moreover, It is your responsibility to keep informed of all the announcements and materials covered during class. While Owlspace is an important resource, not all announcements will be posted there.

Disability Support:

If you have a documented disability that will affect your work in this class, please contact me within the first week to discuss accommodations. Students with disabilities will also need to contact disability support center.

Disclaimer:

The instructor reserves the right to make changes to this syllabus without prior notice. However, once changes are made you will be notified of those changes.